CENTER FOR TROPICAL AND SUBTROPICAL AQUACULTURE

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Letter from the Director

Aloha,

Commercial products made from algae

Earlier this month, CTSA released the pre-proposal selections made by our Industry Advisory Council and Technical Committee, requesting full proposals from the PIs whose projects advanced. Again, we appreciate every PI who took the time to submit a pre-proposal and present it to our committees. For those whose projects did not receive enough IAC and TC support to advance to the full proposal stage, we encourage you to come back in the next development cycle, either with stronger justification or with a new idea. As FY26 projects move into the full proposal stage, I want to restate what guides the Regional Aquaculture Center program: our focus is supporting the aquaculture industry. The work we fund should make current operations more profitable, or lead to the creation of new industry in our region.

At the IAC and TC meeting, some members expressed hesitance about investing in technology for species or systems that we do not raise at large scale in our region, and questioned whether such work would have an impact on local industry. The concern was raised in response to some of the pre-proposals we received, and it is a reasonable one. However, I recently read that Norway (a world leader in salmon farming) has extended its breeding expertise to fund breeding studies in tilapia, a species it does not farm domestically. This raises a few points worth considering. Norway has good reasons to support research to improve the performance and fillet yield in tilapia, a species with no large-scale production in Norway. The rationale behind this is that Norway's strength in genetics can be applied to species that other countries farm, strengthening food security in partner countries and helping Norwegian researchers broaden their horizons. Norway does not make its money raising those species; it sells the improved broodstock and the genetic advances. Similarly, Hawai‘i does not have a shrimp farming industry, but our shrimp broodstock has created significant revenue and opportunity for the state. Expertise applied to a species we do not farm at scale can still be a product. It's a model worth keeping in mind as we evaluate our own proposals.

The ultimate goal in aquaculture is to provide healthy food to people, and to help them meet dietary guidelines that encourage more seafood consumption. It was surprising to me to learn that seafood consumption in Norway and the EU has decreased in recent years. The Norwegian Seafood Council reports that seafood consumption in Norway fell again in 2025 and is down more than 13 percent per person over the past decade, in a country that is among the largest seafood exporters in the world. Researchers there looked into why. The younger generation is cooking less at home, and seafood has become more expensive than competing proteins. A survey of young adults found price and practicality to be the main barriers, and perception remains an issue as well. This is not unique to Norway, and the answers will not come from production alone. We need to strengthen the supply chain so seafood reaches consumers at an affordable price and in forms that are easy to prepare at home. As I say often in this newsletter, we all need to work together to achieve our shared goals.

Mahalo,
Dr. Cheng-Sheng Lee
Executive Director, CTSA

CTSA Project Results: Refining Juvenile and Grow-Out Feeds for Nenue to Optimize Economic Viability

Excerpts from the Project Termination Report submitted by P.I. Armando García-Ortega, University of Hawaii at Hilo

Nenue (*Kyphosus vaigiensis*) has tremendous potential as a commercial aquaculture species. However, there is a need to reduce the cost of diets for juvenile and later grow-out fish, and to reduce reliance on imported feed ingredients. The University of Hawaii at Hilo, in partnership with Ocean Era, Inc., set out to address this gap through the project "Commercializing *Kyphosids*: Refining Juvenile and Grow-Out Feeds for Nenue (*Kyphosus vaigiensis*) to Optimize Economic Viability." With no nenue feed formulations in existence, the research group aimed to identify the most appropriate juvenile diet for nenue, with inclusion of lower-cost and more readily available feedstuffs such as dried copra, dried *Ulva*, and dried *Gracilaria*.

Nenue juveniles were produced at Ocean Era following the company's standard methods for larval rearing. When fish reached an average weight of approximately 3 grams, they were transferred out of the hatchery and into a grow-out system, where a trial to test the use of the seaweed *Ulva* meal in diets for nenue was initiated.

Two experimental feeds were manufactured at the University of Hawaii at Hilo using ground meal from a commercial fish feed as a base diet: a control diet that was the reconstituted commercial feed meal, and a test diet with the commercial feed meal plus 10 percent inclusion of commercial seaweed *Ulva lactuca* meal. Four tanks were each stocked with 35 juvenile nenue, supplied with filtered surface seawater and aeration, and monitored closely for water quality, which remained within normal limits throughout the trial.

The diets were well received by the fish. Specific growth rate was the same for all groups and treatments, at 4 percent per day. The feed conversion ratio was 1.0 for fish fed the control diet and 1.2 for fish fed the seaweed-inclusive diet, both of which are regarded as excellent.

The main accomplishment of the project was to demonstrate that nenue juveniles can be fed a diet made for an omnivore that includes seaweed meal without affecting fish growth. Given that commercial feeds for omnivore fish are made with a lower content of fish meal compared to carnivore fish feeds, these results are encouraging for further testing of feed formulations with low or no marine fish ingredients, which would allow a significant reduction in production costs for nenue at commercial scale.

The successful testing of seaweed *Ulva* meal inclusion in the diet of a marine fish is innovative and contributes to the knowledge of how to produce a marine herbivore fish by aquaculture. The results of this project will contribute to reducing production costs for Pacific Islands fish producers, and can potentially create a market for locally produced plant or macroalgae products. Having well-developed production protocols and operating cost models can inform and encourage prospective fish producers, because they can then plan businesses with greater confidence. Use of locally produced ingredients, such as plants or macroalgae, can also stimulate wider economic activity on island, reduce reliance on imports, and create greater food security.

Three University of Hawaii at Hilo undergraduate students were trained in aquaculture nutrition, feed ingredients processing, feed formulation, and aquafeed manufacture through the project.

Looking ahead, the nenue nutritional requirements for protein and lipids must be determined in juveniles and grow-out fish to improve feed formulations and produce feeds that will yield higher or maximum fish biomass. Further testing of plant ingredients, preferentially of local origin, as protein or lipid sources in feeds for nenue will help determine the economic feasibility of producing this species. Dissemination of the project results will continue through conference presentations by Ocean Era staff, including at Aquaculture America 2027, and a manuscript is in preparation for submission to an aquaculture magazine.

New JWAS Publication: Feasibility of a Local Feed Mill in Hawaii in a Circular Zero-Waste Economy Environment

CTSA would like to highlight a recent JWAS publication by Drs. Tony Ostrowski and Cheng-Sheng Lee, developed through Sea Grant support and informed by a series of CTSA stakeholder meetings, that evaluates the feasibility of establishing a local aquaculture feed mill in Hawai‘i within a zero-waste, circular-economy framework. Central to this effort is Diamond Head Seafood’s state-supported pilot mill, which is now converting its own seafood-processing waste into high-quality fishmeal — demonstrating how industry leadership can transform local by-products into valuable feed ingredients while reducing landfill burdens. This work directly supports CTSA’s priority to reduce production costs for farmers, strengthen regional food resilience, and advance the State of Hawai‘i’s legislative commitment to a circular economy by keeping resources in use and minimizing waste. We encourage readers to explore the full article here.

Regional Aquaculture Announcements

Job Announcements

Assistant Extension Agent, Aquaculture Extension Specialist: University of Hawai'i Sea Grant College Program

The University of Hawai'i Sea Grant College Program is recruiting for an Assistant Extension Agent to serve in an Aquaculture Extension Specialist position, located at the University of Hawai'i at Mānoa on O'ahu with statewide and regional extension, education, and outreach duties and responsibilities. Applications are due September 4, 2026. View the full position description and apply here.

Associate or Full Professor and Director: Mississippi State University Coastal Research and Extension Center

Mississippi State University is recruiting for an Associate or Full Professor and Director to lead its Northern Gulf Aquatic Food Research Program, a 12 month, tenure track position based in Jackson County, Mississippi. The position will manage the university's analytical seafood safety testing laboratory and develop an externally competitive grant funded research program to advance the science and technology related to the utilization and safety of aquatic foods, including shellfish, other economically important marine species, and catfish, while providing programmatic leadership and research direction for faculty and scientists at the Experimental Seafood Processing Laboratory, the Northern Gulf Aquatic Food Research Center, and other Coastal Research and Extension Center facilities. View the full position description and apply here.

Sea Grant Aquaculture Leadership Academy Now Accepting Applications

The Sea Grant Aquaculture Leadership Academy (ALA) is a professional development and training program for early- and mid-career aquaculture extension professionals across the United States, focused on building extension skills, expanding professional networks, and exposing participants to aquaculture in different regions of the country. The 2027 Academy includes two in-person sessions, the first based in Saint Paul and Duluth, Minnesota from May 3 to May 6, 2027, and the second based in Bay City, Texas from October 4 to October 7, 2027, along with virtual programming throughout the year. Individuals from Sea Grant Extension programs, Land Grant Extension programs, federal agencies, and minority serving institutions are eligible to participate. Participants are responsible for travel costs and a $250 registration fee per session, while lodging, meals, and in-session transportation are covered by an award administered by the Mississippi-Alabama Sea Grant Consortium. Applications are due Friday, October 30, 2026 at 5pm CST, and applicants will be notified of their status by December 1, 2026. Questions about eligibility or the application process can be directed to Julia Farley at jgrenn@d.umn.edu. Click here to apply, or visit the ALA website for additional details.

Save the Date: Hawai'i Agriculture Conference (AG2026) in Waikoloa

The 2026 Hawai'i Agriculture Conference will be held November 9-10 at the Waikoloa Beach Marriott Resort & Spa. Since 2002, this event has provided a place for the agricultural community to explore, learn, and network with agricultural leaders, specialists, and affiliated stakeholders. The meeting is an opportunity to make sure our sector is integrated with our State's wider food production and natural resource management sectors. Some highlights include a 1-hour aquaculture session focusing on regenerative and restorative aquaculture, organized by HAAA and industry representatives; Neil Sims (Ocean Era and Kona Limu Company) will be part of the keynote panel; and an Agrifood Innovation Pitch Competition is being organized by Jim Wyban. There are additional opportunities for exhibitors as well as posters presentations. Learn more at hiagconference.org.

Save the Date: 2027 National Aquaculture Extension Workshop in Duluth, MN

The National Aquaculture Extension Workshop, previously known as the National Aquaculture Extension Conference, will be held June 7-10, 2027 in Duluth, Minnesota, hosted by the Minnesota and Wisconsin Sea Grant programs. The workshop provides a forum for professional development and growth for all

levels of experience and years of service in aquaculture extension, with the goal of advancing the ability of the United States to support sustainable aquaculture industries through skill development, information exchange, and professional networking among extension staff. Registration information will be available in the coming months. Learn more at the 2027 National Aquaculture Extension Workshop page.

AquaClip: BLNR delays decision on aquarium fishing

Aquarium fish collecting's future in Hawaii remains uncertain after the Board of Land and Natural Resources heard more than six hours of passionate testimony from the public.

Testifiers were overwhelmingly against reopening the trade, both in written and oral testimonies. They also represented nearly every populated island — with residents from Hawaii Island, Oahu, Maui, Kauai and Molokai present in person and online.

Ahead of the meeting, all four counties passed resolutions urging the board to ban the practice.

The Division of Aquatic Resources proposed aquarium fishing to reopen in West Hawaii Island under strict management, with only five species allowed and annual catch limits. Catch limits for yellow tang would be 100,000 per year, potter's angelfish would be 1,068 per year, 800 mailili per year, 344 hinalea iiwi per year and 182 Thompson's surgeon fish per year. Catch limits apply to the entire fishery management area and not each individual fisherman, DAR fisheries management program manager David Sakoda clarified.

The board voted to direct DAR to further consider alternatives under the public trust doctrine and cultural landscape analyses and also address technical and legal issues before returning to the board. The board did not give an indication over whether it was in favor or opposed to a statewide ban, which was requested by many testifiers.

Aquarium fish collector Eric Moennich asked the board for a contested case hearing on the board's direction, but the request was denied as it is not allowed for rule-making processes.

The meeting was another moment in the decades-long dispute over how aquarium fish collecting and sale intersects with Hawaii's public trust doctrine and prioritization of Native Hawaiian rights.

Aquarium fishing has been banned statewide since December 2020, when courts suspended the commercial marine licenses used for the trade and required any new permits to go through an environmental review. The commercial licenses were a "loophole" used to get around the recreational permits that were banned in a 2017 decision, according to environmental law firm Earthjustice, which sued the state twice to stop the trade. BLNR also considered rulemaking to ban the trade in 2023, but the state Attorney General dissuaded the effort, believing the board did not have the authority to ban it. In April, the First Circuit Court also ruled the DLNR does have the authority to ban aquarium fish collecting statewide...

Source: West Hawaii Today // Full Article

This newsletter is written and prepared by the CTSA Information Specialist Meredith Brooks.
The Center for Tropical and Subtropical Aquaculture (CTSA) is one of five regional aquaculture centers in the United States established and funded by the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) under active grants 2022-38500-38099, 2023-38500-40707, and 2024-38500-42306. The regional aquaculture centers integrate individual and institutional expertise and resources in support of commercial aquaculture development.
CTSA was established in 1986 and is administered by the University of Hawaii.

USDA National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE

UNIVERSITY of HAWAI'I at MĀNOA
COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESILIENCE

Center for Tropical and Subtropical Aquaculture | University of Hawaii at Manoa 1955 East West Road, Ag. Sci. 216 | Honolulu, HI 96822 US

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